

## PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING  
OF A CHANGE(PCT Rule 92bis.1 and  
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

SEPP0 LAINE OY  
Itämerenkatu 3 B  
FIN-00180 Helsinki  
FINLANDE

Date of mailing (day/month/year) 30 January 2002 (30.01.02)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference VAL 218 PCT	
International application No. PCT/FI00/00746	International filing date (day/month/year) 01 September 2000 (01.09.00)

## 1. The following indications appeared on record concerning:

☒ the applicant
 ☐ the inventor
 ☐ the agent
 ☐ the common representative

## Name and Address

VALMET CORPORATION  
Fabianinkatu 9 A  
FIN-00130 Helsinki  
Finland

## State of Nationality

FI

## State of Residence

FI

## Telephone No.

+358-020 484 100

## Facsimile No.

+358-020 484 101

## Teleprinter No.

## 2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person
 ☒ the name
 ☐ the address
 ☐ the nationality
 ☐ the residence

## Name and Address

METSO PAPER, INC.  
Fabianinkatu 9 A  
FIN-00130 Helsinki  
Finland

## State of Nationality

FI

## State of Residence

FI

## Telephone No.

+358-020 484 100

## Facsimile No.

+358-020 484 101

## Teleprinter No.

## 3. Further observations, if necessary:

## 4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

## Authorized officer

Marie-José DEVILLARD

Telephone No.: (41-22) 338.83.38

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner  
 US Department of Commerce  
 United States Patent and Trademark  
 Office, PCT  
 2011 South Clark Place Room  
 CP2/5C24  
 Arlington, VA 22202  
 ETATS-UNIS D'AMERIQUE  
 in its capacity as elected Office

<b>Date of mailing (day/month/year)</b> 08 May 2001 (08.05.01)	
<b>International application No.</b> PCT/FI00/00746	<b>Applicant's or agent's file reference</b> VAL 218 PCT
<b>International filing date (day/month/year)</b> 01 September 2000 (01.09.00)	<b>Priority date (day/month/year)</b> 01 September 1999 (01.09.99)
<b>Applicant</b> KIIHA, Timo et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
 28 March 2001 (28.03.01)

☐ in a notice effecting later election filed with the International Bureau on:  
 \_\_\_\_\_

2. The election ☒ was  
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

<b>The International Bureau of WIPO</b> 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Claudio Borton Telephone No.: (41-22) 338.83.38
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## PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING  
OF A CHANGE(PCT Rule 92bis.1 and  
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

SEPPÖ LAINE OY  
Itämerenkatu 3 B  
FIN-00180 Helsinki  
FINLANDE

Date of mailing (day/month/year) 30 January 2002 (30.01.02)	<b>IMPORTANT NOTIFICATION</b>
Applicant's or agent's file reference VAL 218 PCT	
International application No. PCT/FI00/00746	International filing date (day/month/year) 01 September 2000 (01.09.00)

## 1. The following indications appeared on record concerning:

☒ the applicant      ☐ the inventor      ☐ the agent      ☐ the common representative

Name and Address VALMET CORPORATION Fabianinkatu 9 A FIN-00130 Helsinki Finland	State of Nationality FI	State of Residence FI
	Telephone No. +358-020 484 100	
	Facsimile No. +358-020 484 101	
	Teleprinter No.	

## 2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:


☐ the person      ☒ the name      ☐ the address      ☐ the nationality      ☐ the residence

Name and Address METSO PAPER, INC. Fabianinkatu 9 A FIN-00130 Helsinki Finland	State of Nationality FI	State of Residence FI
	Telephone No. +358-020 484 100	
	Facsimile No. +358-020 484 101	
	Teleprinter No.	

## 3. Further observations, if necessary:

## 4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer  Marie-José DEVILLARD Telephone No.: (41-22) 338.83.38
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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 00/00746

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: D21H 23/48, B05C 5/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: D21H, B05C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5885659 A (SHUNSUKE TAKAHASHI ET AL), 23 March 1999 (23.03.99), column 4, line 41 - line 67 --	1,7-11
X	US 5624715 A (MARKUS GUEGGI ET AL), 29 April 1997 (29.04.97), column 1, line 60 - column 2, line 35 --	1-14
X	US 5340402 A (RUDOLF BEISSWANGER), 23 August 1994 (23.08.94), column 2, line 64 - column 3, line 60 --	1-14

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

13 November 2000

Date of mailing of the international search report

21 -11- 2000

Name and mailing address of the ISA/  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. +46 8 666 02 86

Authorized officer

Barbro Nilsson/Els  
Telephone N . +46 8 782 25 00

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 00/00746

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5820674 A (CYRUS K. AIDUN), 13 October 1998 (13.10.98), column 4, line 66 - column 5, line 45	1-3,11-13
A	--	4-10,14
X	US 5688325 A (CYRUS K. AIDUN), 18 November 1997 (18.11.97), column 2, line 46 - column 3, line 50	1
A	--	2-14
A	US 5773093 A (KAMEO MITANI ET AL), 30 June 1998 (30.06.98), column 6, line 11 - line 17	1-14
	-- -----	

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.

PCT/FI 00/00746

US	5885659	A	23/03/99	DE	19735980 A	26/02/98
				JP	10057868 A	03/03/98
US	5624715	A	29/04/97	EP	0704752 A	03/04/96
				JP	8173879 A	09/07/96
US	5340402	A	23/08/94	CA	2089918 A	22/08/93
				DE	4205313 A,C	26/08/93
				FI	98747 B,C	30/04/97
				FI	930756 A	22/08/93
				JP	5345162 A	27/12/93
				SE	9300114 A	22/08/93
US	5820674	A	13/10/98	AU	3822697 A	06/03/98
				EP	0918571 A	02/06/99
				WO	9806504 A	19/02/98
US	5688325	A	18/11/97	US	5354376 A	11/10/94
				US	5366551 A	22/11/94
US	5773093	A	30/06/98	DE	19622080 A	05/12/96
				JP	9047706 A	18/02/97

The demand must be filed directly with the competent International Preliminary Examining Authority if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ SE

# PCT

## CHAPTER II

### DEMAND

under Article 31 of the Patent Cooperation Treaty:

The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only	
Identification of IPEA	Date of receipt of DEMAND
<b>Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION</b>	
Applicant's or agent's file reference <b>VAL 218 PCT</b>	
International application No. <b>PCT/FI00/00746</b>	International filing date (day/month/year) <b>1 September 2000 (01.09.00)</b>
(Earliest) Priority date (day/month/year) <b>1 September 1999 (01.09.99)</b>	
Title of invention <b>Curtain coater and method for curtain coating</b>	
<b>Box No. II APPLICANT(S)</b>	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) <b>Valmet Corporation Fabianinkatu 9 A FIN-00130 Helsinki Finland</b>	
Telephone No.	
Facsimile No.	
Teleprinter No.	
Applicant's registration No. with the Office	
State (that is, country) of nationality: <b>Finland</b>	State (that is, country) of residence: <b>Finland</b>
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) <b>KIIHA, Timo 25 Bluemound Ct., Apt. 6 Appleton WI 54914 United States of America</b>	
State (that is, country) of nationality: <b>Finland</b>	State (that is, country) of residence: <b>United States of America</b>
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) <b>KOSKINEN, Jukka Vehkatie 89 FIN-04400 Järvenpää Finland</b>	
State (that is, country) of nationality: <b>Finland</b>	State (that is, country) of residence: <b>Finland</b>
<input type="checkbox"/> Further applicants are indicated on a continuation sheet.	

**Box N . III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE**

The following person is ☒ agent ☐ common representative

and ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.

☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.

☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.

Name and address: (Family name followed by given name; for a legal entity, full official designation.  
The address must include postal code and name of country.)

SEPPO LAINE OY  
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Teleprinter No.

Agent's registration No. with the Office

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

**Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION**

**Statement concerning amendments:\***

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filed

the description

☐

as originally filed

☐

as amended under Article 34

the claims

☐

as originally filed

☐

as amended under Article 19 (together with any accompanying statement)

☐

as amended under Article 34

the drawings

☐

as originally filed

☐

as amended under Article 34

2. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.

3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). (This check-box may be marked only where the time limit under Article 19 has not yet expired.)

\* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: English

☐

which is the language in which the international application was filed.

☐

which is the language of a translation furnished for the purposes of international search.

☒

which is the language of publication of the international application.

☐

which is the language of the translation (to be) furnished for the purposes of international preliminary examination.

**Box No. V ELECTION OF STATES**

The applicant hereby elects all eligible States (that is, all States which have been designated and which are bound by Chapter II of the PCT)

excluding the following States which the applicant wishes not to elect:



**Box No. VI CHECK LIST**

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- |  |   |        |
|--|---|--------|
| 1. translation of international application                              | : | sheets |
| 2. amendments under Article 34   | : | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | sheets |
| 4. copy (or, where required, translation) of statement under Article 19  | : | sheets |
| 5. letter  | : | sheets |
| 6. other (specify)   | : | sheets |

For International Preliminary Examining Authority use only

received not received

<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

The demand is also accompanied by the item(s) marked below:

- |  |  |
|--|--|
| 1. <input checked="" type="checkbox"/> fee calculation sheet                             | 5. <input type="checkbox"/> statement explaining lack of signature     |
| 2. <input type="checkbox"/> original separate power of attorney                          | 6. <input type="checkbox"/> sequence listing in computer readable form |
| 3. <input type="checkbox"/> original general power of attorney                           | 7. <input type="checkbox"/> other (specify):                           |
| 4. <input type="checkbox"/> copy of general power of attorney; reference number, if any: |  |

**Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE**

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).

For the applicants

Seppo Laine Oy

Simo Hovi

**For International Preliminary Examining Authority use only**

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply.

☐ The applicant has been informed accordingly.

4. ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.

5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

**For International Bureau use only**

Demand received from IPEA on:

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>VAL 218 PCT</b>	<b>FOR FURTHER ACTION</b>	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. <b>PCT/FI00/00746</b>	International filing date (day/month/year) <b>01.09.2000</b>	Priority date (day/month/year) <b>01.09.1999</b>
International Patent Classification (IPC) or national classification and IPC <sub>7</sub> <b>D 21 H 23/48, B 05 C 5/02</b>		
Applicant <b>Valmet Corporation et al</b>		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand <b>28.03.2001</b>	Date of completion of this report <b>19.12.2001</b>
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer <b>William Helin/Els</b> Telephone No. 08-782 25 00

**I. Basis of the report****1. With regard to the elements of the international application:\***

- ☐ the international application as originally filed
- ☒ the description:  
pages 2, 4 - 7, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages 1, 3, filed with the letter of 15.10.2001
- ☒ the claims:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, as amended (together with any statement) under article 19  
pages \_\_\_\_\_, filed with the demand  
pages 8 - 11, filed with the letter of 15.10.2001
- ☒ the drawings:  
pages 2, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the sequence listing part of the description:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

**2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.**

These elements were available or furnished to this Authority in the following language English which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☒ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

**3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:**

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

**4. ☐ The amendments have resulted in the cancellation of:**

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheet/fig \_\_\_\_\_

**5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).\*\***

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims	<u>1-12</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-12</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-12</u>	YES
	Claims		NO

**2. Citations and explanations (Rule 70.7)**

The following documents were cited in the International Search Report:

D1: US 5 624 715  
D2: US 5 340 402  
D3: US 5 885 659

Document D1 discloses a method for curtain coating where an evacuating device is utilised to evacuate air carried along with the web. An air shield is disposed in front of the liquid film and the residual air is evacuated through a slot connected to a ventilator. Further, a second ventilator supplies air to a substantially closed space where the coating takes place.

Document D2 relates to a coating system for application of coating colour on a paper web. The application zone is preceded by a slat, which scrapes off the air film clinging to the paper web. An air channel through the slat vents the gap space between the web and the slat.

Through document D3, a curtain coating apparatus using an air shielding device to shield airflow accompanied by the web is known.

.../...

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

None of the documents above display an outwardly curved surface on the doctoring means in accordance with the claimed invention. Owing the outwardly curved surface of the air doctoring means, the web can be supported at the doctoring point by the doctoring means itself, hence, there is no need for a backing roll. Without the backing roll, no gap preventing the doctoring means from touching the web is required. Thereby, the distance between the web and the doctoring means can be reduced. A further advantage of the fact that the doctoring means supports the web is that the travelling direction of the web can be altered by the doctoring means.

According to the arguments stated above, the invention claimed in claims 1-12 is novel, is considered to involve an inventive step and to be industrially applicable.

5 -10- 2001

1

# **Curtain coater and method for curtain coating**

5 The present invention relates to curtain coater according to the preamble of claim 1 and to curtain-coating method according to the preamble of claim 10.

10 In a curtain coater, the coating mix is applied to the surface of a moving web of paper or board, generally from a nozzle extending over the full cross-machine width of the web and located above the web being coated, whereby the coating mix can fall onto the web surface as curtain-like shower. Curtain coating is categorized as a noncontacting coating method, wherein the applicator  
15 itself makes no contact with the web being coated, but instead, the coating mix is applied to the web surface in the form of a free-falling curtain of coating mix. The technique of curtain coating is described, e.g., in publication DE 196 22 080.

20

During its travel, a moving web gathers a thin boundary layer of air that moves along with the web. In curtain coaters, the momentum of the coating mix applied to the web surface is small as compared to the momentum of the coating mix amount directed from a jet applicator, for  
25 instance, which means that the boundary air layer traveling on the web surface can easily scatter the curtain of coating mix flowing from the nozzle of a curtain coater thus making the applied coating layer uneven. With higher  
30 web speeds in the coater station, the problem is accentuated due to the faster speed of the boundary air layer and its higher momentum. Hence, the control of the

the web to the application zone. In one embodiment of the invention, the amount of the boundary air coming to the application zone is reduced by means of a suction nozzle cooperating with the air-doctoring element, whereby the boundary air layer is removed via the suction nozzle by a vacuum. Additionally, the adherence of the coating mix curtain to the web surface can be augmented by means of a gas-injection nozzle mounted downstream after the applicator nozzle in the travel direction of the web, whereby a gas jet can be directed from the gas-injection nozzle toward the coating mix curtain. Hereby, the combined momentum of the coating mix curtain and the gas jet becomes sufficiently energetic to force the coating mix to penetrate through the boundary air layer traveling on the web surface.

More specifically, the curtain coaters according to the invention are characterized by what is stated in the characterizing part of claims 1.

Furthermore, the curtain-coating method according to the invention is characterized by what is stated in the characterizing part of claims 10.

The invention offers significant benefits.

In a curtain coater according to the invention, the amount of boundary air traveling on the web being coated to the application zone can be reduced significantly as compared with conventional curtain coaters, whereby the coat quality and web runnability in the coater are improved. The web speed in a curtain coater according to

## Claims:

1. Curtain coater for coating a moving web (2) of paper or board, the curtain coater comprising an applicator nozzle (1) located above the web (2) to be coated so as to apply the coating mix therefrom to the surface of the web (2) in the form of a continuous curtain extending uniformly over the cross-machine width of the web (2), and doctoring means (3) serving to remove the boundary air layer traveling on the surface of the web (2) by being located upstream in the travel direction of the web (2) in front of the impingement point of the coating mix curtain on the surface of the web (2) and further being located on the same side of the web (2) as the applicator nozzle (1) characterized in that the surface of the doctoring means (3) facing the web is outward curved in order to support the web (2) at the doctoring point.
2. Curtain coater according to claim 1, characterized by a gas-injection nozzle (5) located downstream in the travel direction of the web (2) after the applicator nozzle (1) so as to extend over the cross-machine width of the web (2) and adapted to blow gas via said gas-injection nozzle toward the coating mix curtain being applied from the applicator nozzle (1).
3. Curtain coater according to claim 1 or 2, characterized by a suction nozzle (4) extending over the cross-machine width of the web (2) and adapted to said doctoring means (3) so as to remove by suction the boundary air layer traveling on the surface of the web



(2).

4. Curtain coater according to claim 3, c h a r a c -  
t e r i z e d in that the inlet opening (7) of the  
5 suction nozzle (4) is adapted to rear wall of the  
doctoring means (3).

5. Curtain coater according to claim 3 or 4, c h a r -  
a c t e r i z e d in that the inlet opening (7) of the  
10 suction nozzle (4) is adapted to the surface of the  
doctoring means (3) facing the web (2).

6. Curtain coater according to any one of foregoing  
claims, c h a r a c t e r i z e d in that the surface  
15 of the doctoring means (3) facing the web (2) has a  
curved shape.

7. Curtain coater according to claim 6, c h a r a c -  
t e r i z e d in that the distance of the web (2) from  
20 the curved surface of the doctoring means (3) is in the  
range of 0-500  $\mu$ m.

8. Curtain coater according to any one of foregoing  
claims, c h a r a c t e r i z e d in that said  
25 doctoring means (3) is a doctor bar.

9. Curtain coater according to any one of foregoing  
claims, c h a r a c t e r i z e d in that the distance  
along the surface of the web (2) from the doctoring point  
30 of said doctoring means (3) to the application point  
under said applicator nozzle (1) is less than 50 mm.

10. Curtain-coating method for coating a moving web (2) of paper or board, in which method

- 5                   - the web (2) to be coated is passed to a coater station,
- 10                  - using an applicator nozzle (1) located above the web (2), the coating mix is therefrom applied to the surface of the web (2) in the form of a continuous curtain extending uniformly over the cross-machine width of the web (2), and
- 15                  - the boundary air layer traveling along with the web is removed from the surface of the web (2) facing said applicator nozzle (1) with the help of a doctoring means (3) located upstream in the travel direction of the web (2) in front of the applicator nozzle (1),

20   c h a r a c t e r i z e d   i n   t h a t   outward curved doctoring means (3) is used in order to support the web (2) at the doctoring point.

11. Curtain-coating method according to claim 10,  
25   c h a r a c t e r i z e d   i n   t h a t   g a s   i s   b l o w n   t o w a r d   t h e   c o a t i n g   m i x   c u r t a i n   b e i n g   a p p l i e d   f r o m   t h e   a p p l i c a t o r   n o z z l e   ( 1 )   f r o m   a   g a s - i n j e c t i o n   n o z z l e   ( 5 )   t h a t   i s   l o c a t e d   d o w n s t r e a m   i n   t h e   t r a v e l   d i r e c t i o n   o f   t h e   w e b   ( 2 )   a f t e r   t h e   a p p l i c a t o r   n o z z l e   ( 1 )   a n d   i s   a d a p t e d   t o   e x t e n d  
30   o v e r   t h e   c r o s s - m a c h i n e   w i d t h   o f   t h e   w e b   ( 2 ) .

12. Curtain-coating method according to claim 10 or 11,

c h a r a c t e r i z e d in that the boundary air layer traveling on the surface of the web (2) is removed by suction applied by a suction nozzle (4) adapted to said doctoring means (3).

# RECORD COPY

PCT REQUEST

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VAL 218 PCT

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0 0-1	For receiving Office us nly International Application No.	PCT/FI 0 0 / 0 0 7 4 6
0-2	International Filing Date	0 1 SEP 2000 ( 0 1 -09- 2000 )
0-3	Name of receiving Office and "PCT International Application"	The Finnish Patent Office PCT International Application
0-4 0-4-1	Form - PCT/RO/101 PCT Request Prepared using	PCT-EASY Version 2.91 (updated 01.07.2000)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	National Board of Patents and Registration (Finland) (RO/FI)
0-7	Applicant's or agent's file reference	VAL 218 PCT
I	Title of invention	CURTAIN COATER AND METHOD FOR CURTAIN COATING
II II-1 II-2 II-4 II-5  II-6 II-7 II-8 II-9	Applicant This person is: Applicant for Name Address:  State of nationality State of residence Telephone No. Facsimile No.	applicant only all designated States except US VALMET CORPORATION Fabianinkatu 9 A FIN-00130 Helsinki Finland FI FI +358-020 484 100 +358-020 484 101
III-1 III-1-1 III-1-2 III-1-4 III-1-5  III-1-6 III-1-7	Applicant and/or inventor This person is: Applicant for Name (LAST, First) Address:  State of nationality State of residence	applicant and inventor US only KIIHA, Timo 25 Bluemound Ct Apt 6 <del>Appleton</del> <sup>4A</sup> Appleton, WI 54914 United States of America FI US

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III-2	<b>Applicant and/ r inv nt r</b>	
III-2-1	This person is:	applicant and inventor
III-2-2	Applicant for	US only
III-2-4	Name (LAST, First)	KOSKINEN, Jukka
III-2-5	Address:	Vehkatie 89 FIN-04400 Järvenpää Finland
III-2-6	State of nationality	FI
III-2-7	State of residence	FI
IV-1	<b>Agent or common representative; or address for correspondence</b> The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
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V	<b>Designation of States</b>	
V-1	Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AP: GH GM KE LS MW MZ SD SL SZ TZ UG ZW and any other State which is a Contracting State of the Harare Protocol and of the PCT EA: AM AZ BY KG KZ MD RU TJ TM and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE and any other State which is a Contracting State of the European Patent Convention and of the PCT OA: BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG and any other State which is a member State of OAPI and a Contracting State of the PCT

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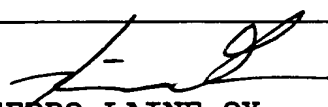
Original (for **SUBMISSION**) - printed on 01.09.2000 09:59:14 AM

<b>V-2</b>	National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AE AG AL AM AT (patent and utility model) AU AZ BA BB BG BR BY BZ CA CH&LI CN CR CU CZ (patent and utility model) DE (patent and utility model) DK (patent and utility model) DM DZ EE (patent and utility model) ES FI (patent and utility model) GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK (patent and utility model) SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW	
<b>V-5</b>	<b>Precautionary Designation Statement</b> In addition to the designations made under items V-1, V-2 and V-3, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except any designation(s) of the State(s) indicated under item V-6 below. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit.		
<b>V-6</b>	<b>Exclusion(s) from precautionary designations</b>	NONE	
<b>VI-1</b>	<b>Priority claim of earlier national application</b>		
VI-1-1	Filing date	01 September 1999 (01.09.1999)	
VI-1-2	Number	19991863	
VI-1-3	Country	FI	
<b>VI-2</b>	<b>Priority document request</b> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):	VI-1	
<b>VII-1</b>	<b>International Searching Authority Chosen</b>	Swedish Patent Office (ISA/SE)	
<b>VIII</b>	<b>Check list</b>	number of sheets	electronic file(s) attached
VIII-1	Request	4	-
VIII-2	Description	6	-
VIII-3	Claims	4	-
VIII-4	Abstract	1	val218pct.txt
VIII-5	Drawings	2	-
VIII-7	TOTAL	17	

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	Accompanying items	paper document(s) attached	electronic file(s) attached
VIII-8	Fee calculation sheet	✓	-
VIII-9	Separate signed power of attorney	✓	-
VIII-16	PCT-EASY diskette	-	diskette
VIII-17	Other (specified):	Copy of official action	-
VIII-18	Figure of the drawings which should accompany the abstract		
VIII-19	Language of filing of the international application	Finnish	
IX-1	Signature of applicant or agent		
IX-1-1	Name	SEPPÖ LAINE OY	
IX-1-2	Name of signatory	Simo Hovi	
IX-1-3	Capacity	Patent Agent	

## FOR RECEIVING OFFICE USE ONLY

10-1	Date of actual receipt of the purported international application	01 SEP 2000	( 01 -09- 2000 )
10-2	Drawings:		
10-2-1	Received		
10-2-2	Not received		
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application		
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)		
10-5	International Searching Authority	ISA/SE	
10-6	Transmittal of search copy delayed until search fee is paid		

## FOR INTERNATIONAL BUREAU USE ONLY

11-1	Date of receipt of the record copy by the International Bureau	26 SEPTEMBER 2000	( 26. 09. 00 )
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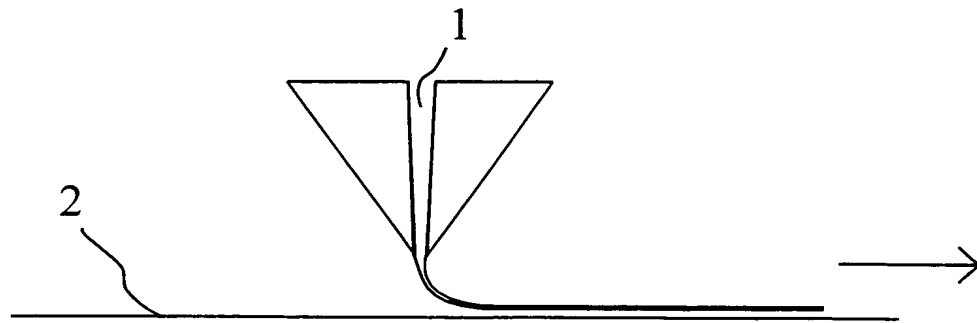


Fig. 1

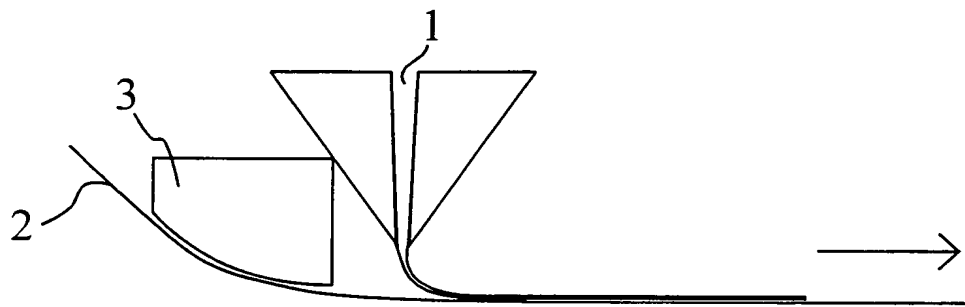


Fig. 2

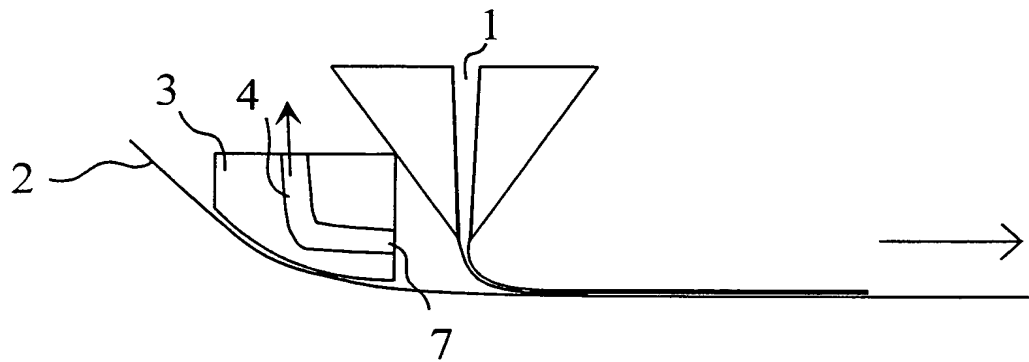


Fig. 3

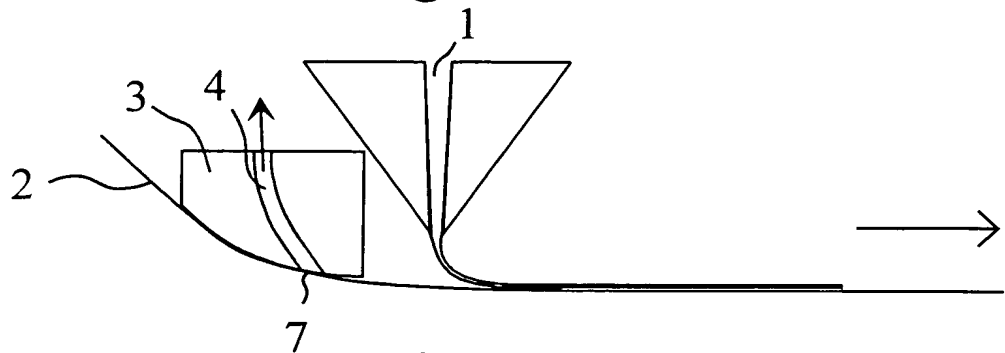


Fig. 4



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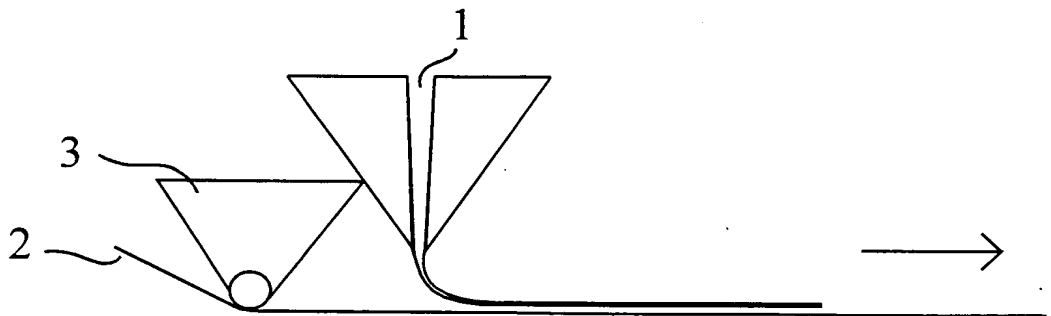


Fig. 5

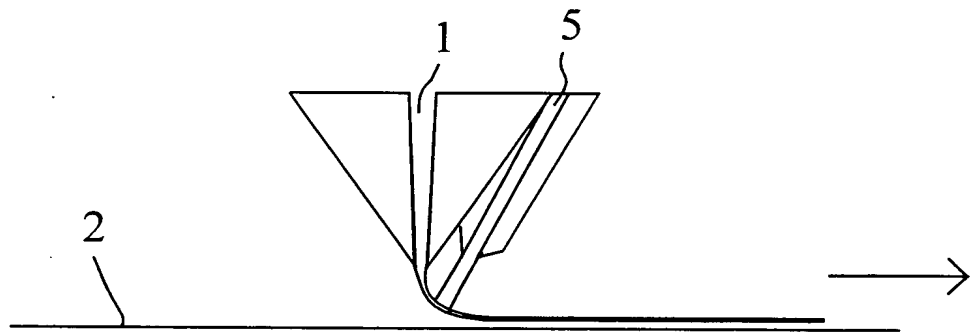


Fig. 6

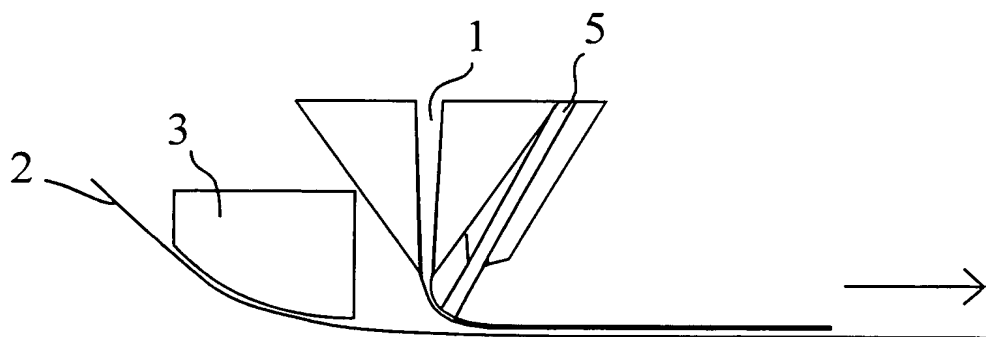


Fig. 7

## Verhopäällystin ja verhopäällystysmenetelmä

Tämän keksinnön kohteina ovat patenttivaatimusten 1 ja 2 johdantojen mukaiset verhopäällystimet ja patenttivaatimusten 11 ja 12 johdantojen mukaiset verhopäällystysmenetelmät.

Verhopäällystimessä päällysteseosta applikoidaan liikkuvan paperi- tai kartonkirainan pinnalle yleensä päällystettävän rainan yläpuolelle sijoitetusta, rainan levyisestä suuttimesta, jolloin päällysteseos putoaa rainan pinnalle verho-  
maisena suihkuna. Verhopäällystys on ns. kosketukseton  
päällystysmenetelmä, jossa itse applikointilaite ei kosketa  
päällystettävää rainaa ollenkaan vaan päällysteseos appli-  
koidaan vapaasti rainan pinnalle. Verhopäällystystä on ku-  
vattu mm. julkaisussa DE 196 22 080.

Liikkuvan rainan pinnalle muodostuu ohut ilmakerros, joka kulkee rainan mukana. Verhopäällystimissä rainan pinnalle  
applikoitavan päällysteseoksen liikemäärä on pieni esimer-  
kiksi jet-päällystimestä applikoitavan päällysteseoksen  
liikemäärään verrattuna, minkä takia rainan mukana kulkeva  
rajakerrosilma hajottaa helposti verhopäällystimen suutti-  
mesta applikoitavan päällysteseosverhon, jolloin päällysteseoskerroksesta muodostuu epätasainen. Päällystysaseman  
ajonopeuden kasvaessa ongelma pahenee entisestään, koska  
rajakerrosilman nopeus ja liikemäärä lisääntyvät. Ajonopeu-  
den kasvaessa rajakerrosilman hallinta onkin yksi merkittä-  
vimmistä verhopäällystimen ajettavuuteen vaikuttavista omi-  
naisuuksista.

Rajakerrosilman aiheuttamaa ongelmaa voidaan vähentää esi-  
merkiksi kasvattamalla päällysteseoksen putouskorkeutta ja

sitä kautta nopeutta tai lisäämällä applikoitavan päällysteseoksen määrää, jolloin päällysteseoksen liikemäärää lisääntyy ja päällysteverho tunkeutuu helpommin rainan pinnalla olevan ilmakerroksen läpi. Päällysteverhon putouskorkeutta ei kuitenkaan yleensä voida lisätä riittävästi, koska päällysteverho alkaa kuroutua ja hajota putouskorkeuden kasvaessa. Lisäksi applikoitavan päällysteseoksen määrää lisättäessä on rainan pinnalta kaavittava ylimääräinen päällysteseos pois.

10

Tämän keksinnön tarkoituksena on saada aikaan aivan uudenlainen verhopäällystin ja verhopäällystysmenetelmä, joilla rajakerrosilman tunkeutumista verhopäällystimen applikointialueelle voidaan oleellisesti vähentää.

15

Keksintö perustuu siihen, että päällystettävän rainan kulkusuunnassa ennen applikointikohtaa sijoitetaan kaavinelin, jolla rainan pinnalla olevaa rajakerrosilmaa poistetaan. Kaavinelin vähentää huomattavasti rainan mukana applikointialueelle tulevaa ilmamäärää. Yhdessä keksinnön sovellusmuodossa applikointialueelle tulevan rajakerrosilman määrää vähennetään kaavinelimessä olevalla imuyhteellä, jonka kautta rainan pinnalla olevaa rajakerrosilmaa imetään pois. Päällysteseosverhon kiinnittymistä rainan pinnalle voidaan lisäksi parantaa rainan kulkusuunnassa applikointisuuttimen jälkeen sijoitettavalla kaasusuuttimella, josta puhallettava kaasusuihku on suunnattu kohti päällysteseosverhoa. Tällöin päällysteseosverhon ja kaasusuihkun yhteenlaskettu liikemäärä riittää painamaan päällysteseoksen rainan pinnalla olevan ilmakerroksen läpi.

30

Täsmällisemmin sanottuna keksinnön mukaisille verhopäällystymille on tunnusomaista se, mikä on esitetty patenttivaatimusten 1 ja 2 tunnusmerkkiosissa.

- 5      Keksin­nön mukaisille verhopäällystysmenetelmille puolestaan on tunnusomaista se, mikä on esitetty patenttivaatimusten 11 ja 12 tunnusmerkkiosissa.

Keksinnön avulla saavutetaan huomattavia etuja.

10

Keksinnön mukaisessa verhopäällystymessä päällystettävän rainan mukana applikointialueelle kulkevan rajakerrosilman määrä vähenee huomattavasti tavanomaisiin verhopäällystymiin verrattuna, minkä ansiosta päällystimen päällystysjälki ja ajettavuus paranevat. Keksin­nön mukaisen verhopäällystimen ajonopeutta voidaan helposti kasvattaa, koska rajakerrosilmaa pystytään tehokkaasti poistamaan rainan pinnalta ennen applikointia.

15

- 20      Keksintöä kuvataan seuraavassa tarkemmin viittaamalla oheisiin piirustuksiin.

Kuvio 1 esittää kaaviollisesti tavanomaisen verhopäällystimen poikkileikkausta.

25

Kuviot 2-7 esittävät kaaviollisesti keksinnön mukaisen verhopäällystimen eri sovellusmuotojen poikkileikkauksia.

30

Kuviossa 1 esitetty tavanomainen verhopäällystin käsittää rainan 2 yläpuolella olevan rainan 2 leveyssuuntaisen applikointisuuttimen 1, josta päällysteseosta applikoidaan liikkuvan rainan 2 pinnalle. Rainan 2 kulkusuunta on merkitty nuolella. Rainan 2 pinnalla kulkeva rajakerrosilma

kääntää suuttimesta 1 applikoitavaa päällysteseosverhoa  
rainan 2 kulkusuuntaan. Ajonopeuden ollessa riittävän suuri  
kaikki päällysteseosverho hajoaa ja osa päällysteseoksesta  
kulkee rajakerrosilman mukana rainan 1 kulkusuuntaan, jol-  
5 loin rainan 2 pinnalle muodostuu kohtia, joissa ei ole  
päällystettä lainkaan.

Kuviossa 2 verhopäällystimen applikointisuuttimen 1 appli-  
kointialueen eteen on rainan 2 kulkusuunnassa sijoitettu  
10 kaarevapintainen, rainan 2 leveyssuuntainen kaavinelin 3,  
joka hajottaa rainan pinnalla 2 kulkevan rajakerrosilman ja  
vähentää päällystysjälkeä heikentävän ilman kulkeutumista  
applikointialueelle. Kaavinelin 3 on sijoitettu siten, että  
sen kaareva pinta on rainan 2 yläpuolella. Liikkuvan rainan  
15 2 ja kaavinelimen 3 väliin muodostuu yleensä ilmakerros,  
jonka paksuuteen vaikuttavat mm. rainan 2 nopeus ja kaa-  
vinelimen kaarevan osan kaarevuussäde. Tavallisesti rainan  
2 ja kaavinelimen 3 kaarevan osan väliin jäävän ilmakerrok-  
sen paksuus on noin 0-500  $\mu$ m. Kaavinelimen 3 vasten rainaa  
20 2 olevan kaarevan osan loppukohta on edullista sijoittaa  
mahdollisimman lähelle suuttimen 1 applikointikohdan alkua,  
koska rainan 2 pinnalla oleva ilmakerros muodostuu nopeasti  
uudestaan kaavinelimen 3 jälkeisellä vapaalla osuudella.  
Ilmakerros saattaa kehittyä alkuperäiseen paksuuteensa jo  
25 50 mm:n matkalla.

Kuvion 3 sovellusmuodossa kuviossa 2 kuvattuun kaavineli-  
meen 3 on lisätty rainan 2 leveyssuuntainen imukanava 4,  
jonka suuaukko 7 on sijoitettu kaavinelimen 3 takaosaan.  
30 Rainan 2 pinnalla olevaa rajakerrosilmaa imetään imukana-  
vaan 4.

Kuviossa 4 imukanavan 4 suuaukko 7 on sijoitettu kaavineli-  
men 3 kaarevaan, rainan 2 kanssa vastakkain olevaan pin-  
taan.

- 5 Kuviossa 5 kaavineliimenä käytetään ennen applikointisuutti-  
men 1 applikointialuetta sijoitettua sauvakaavinta 3, jonka  
sauva koskettaa liikkuvaa rainaa 2 ja estää rainan 2 pin-  
nalla olevan rajakerrosilman kulkeutumisen applikointialu-  
eelle.

10

- Kuvion 6 sovellusmuodossa rainan 2 kulkusuunnassa päällyys-  
teseoksen applikointisuuttimen 1 jälkeen on sijoitettu rai-  
nan 2 leveyssuuntainen kaasusuutin 5, josta puhalletaan  
kaasua kohti applikointisuuttimesta putoavaa päällysteseos-  
15 verhoa. Tässä keksinnössä kaasulla tarkoitetaan kaikkia  
kaasufaasissa olevia aineita, kuten ilmaa, muita kaasuja ja  
vesihöyryä. Kun kaasusuuttimesta 5 tulevan kaasusuihkun ja  
päällysteseosverhossa olevan päällysteseoksen yhteenlasket-  
tu liikemäärä on riittävän suuri verrattuna liikkuvan rai-  
20 nan 2 pinnalla olevan rajakerrosilman liikemäärään, pääl-  
lysteseosverho kiinnittyy rainan 2 pinnalle. Applikoin-  
tisuuttimesta 1 ja kaasusuuttimesta 5 tulevat suihkut koh-  
taavat toisensa ennen kuin päällysteseosverho osuu rainaan  
2. Kaasusuuttimen 5 toimintapainetta muuttamalla voidaan  
25 kontrolloida päällysteseoksen kiinnittymistä rainan 2 pin-  
nalle.

- Kuvion 7 sovellusmuodossa on kuviossa 6 kuvattuun sovellus-  
muotoon lisätty rainan 2 pinnalla olevaa rajakerrosilmaa  
30 poistava, rainan 2 kulkusuunnassa ennen applikointisuutinta  
1 oleva kaavinelin 3. Tällöin kaavinelin 3 poistaa osan ra-  
jakerrosilmasta ja kaasusuutin 5 varmistaa päällysteseos-  
verhon kiinnittymisen rainan 2 pinnalle.

Keksinnöllä on myös edellä kuvatusta poikkeavia sovellusmuotoja.

- 5 Kaavinelimenä 3 voidaan käyttää myös pientä telaa, joka pyörii tai on paikallaan. Myös edellä esitettyjen sovellusmuotojen erilaiset muunnelmät ovat mahdollisia. Esimerkiksi kuviossa 7 esitetyn sovellusmuodon kaavinelimeen 3 voidaan tarvittaessa lisätä kuvioiden 3 ja 4 sovellusmuodoissa kuvatut imuyhteet 4 rainan 2 pinnalla olevan rajakerrosilman poiston tehostamiseksi.
- 10

## Patenttivaatimukset:

1. Verhopäällystin liikkumaan sovitettun paperi- tai kartonkirainan (2) päällystämiseksi, joka verhopäällystin käsittää päällystettävän rainan (2) yläpuolelle sovitettun applikointisuuttimen (1), josta päällysteseos on sovitettu applikoitavaksi rainan (2) pinnalle yhtenäisenä rainan (2) leveyssuuntaisena verhona, tunnettu rainan (2) pinnalla olevan rajakerrosilman poistamiseen tarkoitetusta, rainan (2) kulkusuunnassa ennen päällysteseoksen rainan (2) pinnalle osumakohtaa sovitetusta kaavinelmestä (3), joka on sovitettu samalle puolelle rainaa (2) kuin applikointisuutin (1).
2. Verhopäällystin liikkumaan sovitettun paperi- tai kartonkirainan (2) päällystämiseksi, joka verhopäällystin käsittää päällystettävän rainan (2) yläpuolelle sovitettun applikointisuuttimen (1), josta päällysteseos on sovitettu applikoitavaksi rainan (2) pinnalle yhtenäisenä rainan (2) leveyssuuntaisena verhona, tunnettu rainan (2) kulkusuunnassa applikointisuuttimen (1) jälkeen sovitetusta rainan (2) leveyssuuntaisesta kaasusuuttimesta (5), joka on sovitettu puhaltamaan kaasua applikointisuuttimesta (1) applikoitavaa päällysteseosverhoa kohti.
3. Patenttivaatimuksen 1 mukainen verhopäällystin, tunnettu rainan (2) kulkusuunnassa applikointisuuttimen (1) jälkeen sovitetusta rainan (2) leveyssuuntaisesta kaasusuuttimesta (5), joka on sovitettu puhaltamaan kaasua applikointisuuttimesta (1) applikoitavaa päällysteseosverhoa kohti.



4. Patenttivaatimuksen 1 tai 3 mukainen verhopäällystin, tunnettu kaavinelineen (3) sovitetusta rainan (2) leveyssuuntaisesta, rainan (2) pinnalla olevan rajakerrosilman imemiseen tarkoitettusta imuyhteestä (4).
- 5
5. Patenttivaatimuksen 4 mukainen verhopäällystin, tunnettu siitä, että imuyhteen (4) imupää (6) on sovitettu kaavinelimen (3) takaseinään.
- 10
6. Patenttivaatimuksen 4 tai 5 mukainen verhopäällystin, tunnettu siitä, että imuyhteen (4) imupää (6) on sovitettu kaavinelimen (3) rainan (2) kanssa vastakkain sovitettuun pintaan.
- 15
7. Jonkin edellä olevan patenttivaatimuksen mukainen verhopäällystin, tunnettu siitä, että kaavinelimen (3) rainan (2) kanssa vastakkain sovitettu pinta on kaareva.
8. Patenttivaatimuksen 7 mukainen verhopäällystin, tunnettu siitä, että rainan (2) etäisyys kaavinelimen (3) kaarevasta pinnasta on 0-500  $\mu\text{m}$ .
- 20
9. Jonkin edellä olevan patenttivaatimuksen mukainen verhopäällystin, tunnettu siitä, että kaavinelin (3) on sauvakaavin.
- 25
10. Jonkin edellä olevan patenttivaatimuksen mukainen verhopäällystin, tunnettu siitä, että kaavinelimen (3) kaavintakohdan ja applikointisuuttimen (1) applikointikohdan välinen etäisyys rainan (2) pinnalla on alle 50 mm.
- 30

11. Verhopäällystysmenetelmä liikkuvan paperi- tai kartonki-  
rainan (2) päällystämiseksi, jossa menetelmässä

5 - tuodaan päällystettävä raina (2) päällystysase-  
malle, ja

- applikoidaan rainan (2) yläpuolelle sovitetulla  
applikointisuuttimella (1) päällysteseosta rai-  
nan (2) pinnalle yhtenäisenä rainan (2) leveys-  
10 suuntaisena verhona,

tunnettu siitä, että poistetaan rainan (2) appli-  
kointisuuttimen (1) puoleisella pinnalla olevaa rajaker-  
rosilmaa rainan (2) kulkusuunnassa ennen applikointisuu-  
15 tinta (1) sovitetulla kaavinelimellä (3).

12. Verhopäällystysmenetelmä liikkuvan paperi- tai kartonki-  
rainan (2) päällystämiseksi, jossa menetelmässä

20 - tuodaan päällystettävä raina (2) päällystysase-  
malle, ja

- applikoidaan rainan (2) yläpuolelle sovitetulla  
applikointisuuttimella (1) päällysteseosta rai-  
nan (2) pinnalle yhtenäisenä rainan (2) leveys-  
25 suuntaisena verhona,

tunnettu siitä, että puhalletaan rainan (2) kulku-  
suunnassa applikointisuuttimen (1) jälkeen sovitetusta  
rainan (2) leveyssuuntaisesta kaasusuuttimesta (5) kaasua  
30 applikointisuuttimesta (1) applikoitavaa päällysteseos-  
verhoa kohti.

13. Patenttivaatimuksen 11 mukainen verhopääallystysmenetelmä, tunnettu siitä, että puhalletaan rainan (2) kuluksuunnassa applikointisuuttimen (1) jälkeen sovitettulla rainan (2) leveyssuuntaisella kaasusuuttimella (5) kaasua applikointisuuttimesta (1) applikoitavaa pääallysteseosverhoa kohti.
14. Patenttivaatimuksen 11 tai 13 mukainen verhopääallystysmenetelmä, tunnettu siitä, että imetään rainan (2) pinnalla olevaa rajakerrosilmaa kaavinelimeen (3) sovitettulla imuyhteellä (4).

## (57) Tiivistelmä:

Tämä kekisintö koskee verhopääallystintä ja verhopääallystysmenetelmää liikkumaan sovitettun paperi- tai kartonkirainan (2) pääallystämiseksi. Verhopääallystin käsittää pääallystettävän rainan yläpuolelle (2) sovitettun applikointisuuttimen (1), josta pääallysteseosta applikoidaan rainan (2) pinnalle yhtenäisenä rainan (2) leveyssuuntaisena verhona. Rainan (2) pinnalla olevaa rajakerrosilmaa poistetaan rainan (2) kulkusuunnassa ennen pääallysteseoksen rainan (2) pinnalle osumakohtaa sovitetulla kaavinelimellä (3), joka on sovitettu samalle puolelle rainaa (2) kuin applikointisuutin (1).

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0	For receiving Office use only	
0-1	International Application No.	
0-2	International Filing Date	
0-3	Name of receiving Office and "PCT International Application"	
0-4	Form - PCT/RO/101 PCT Request Prepared using	PCT-EASY Version 2.91 (updated 01.07.2000)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	National Board of Patents and Registration (Finland) (RO/FI)
0-7	Applicant's or agent's file reference	VAL 218 PCT
I	Title of invention	CURTAIN COATER AND METHOD FOR CURTAIN COATING
II	Applicant	applicant only
II-1	This person is:	all designated States except US
II-2	Applicant for	VALMET CORPORATION
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II-7	State of residence	FI
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III-1-6	State of nationality	FI
III-1-7	State of residence	US

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III-2	<b>Applicant and/or inventor</b>	
III-2-1	This person is:	applicant and inventor
III-2-2	Applicant for	US only
III-2-4	Name (LAST, First)	KOSKINEN, Jukka
III-2-5	Address:	Vehkatie 89 FIN-04400 Järvenpää Finland
III-2-6	State of nationality	FI
III-2-7	State of residence	FI
IV-1	<b>Agent or common representative; or address for correspondence</b> The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
IV-1-1	Name	SEPPO LAINE OY
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IV-1-4	Facsimile No.	+358-9-68 595 610
IV-1-5	e-mail	seppo.laine@selpat.fi
V	<b>Designation of States</b>	
V-1	Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AP: GH GM KE LS MW MZ SD SL SZ TZ UG ZW and any other State which is a Contracting State of the Harare Protocol and of the PCT EA: AM AZ BY KG KZ MD RU TJ TM and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE and any other State which is a Contracting State of the European Patent Convention and of the PCT OA: BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG and any other State which is a member State of OAPI and a Contracting State of the PCT

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<b>V-2</b>	National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	<b>AE AG AL AM AT (patent and utility model) AU AZ BA BB BG BR BY BZ CA CH&amp;LI CN CR CU CZ (patent and utility model) DE (patent and utility model) DK (patent and utility model) DM DZ EE (patent and utility model) ES FI (patent and utility model) GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK (patent and utility model) SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW</b>	
<b>V-5</b>	Precautionary Designation Statement In addition to the designations made under items V-1, V-2 and V-3, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except any designation(s) of the State(s) indicated under item V-6 below. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit.		
<b>V-6</b>	Exclusion(s) from precautionary designations	<b>NONE</b>	
<b>VI-1</b>	Priority claim of earlier national application		
<b>VI-1-1</b>	Filing date	<b>01 September 1999 (01.09.1999)</b>	
<b>VI-1-2</b>	Number	<b>19991863</b>	
<b>VI-1-3</b>	Country	<b>FI</b>	
<b>VI-2</b>	Priority document request The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):	<b>VI-1</b>	
<b>VII-1</b>	International Searching Authority Chosen	<b>Swedish Patent Office (ISA/SE)</b>	
<b>VIII</b>	Check list	number of sheets	electronic file(s) attached
<b>VIII-1</b>	Request	<b>4</b>	-
<b>VIII-2</b>	Description	<b>6</b>	-
<b>VIII-3</b>	Claims	<b>4</b>	-
<b>VIII-4</b>	Abstract	<b>1</b>	<b>val218pct.txt</b>
<b>VIII-5</b>	Drawings	<b>2</b>	-
<b>VIII-7</b>	TOTAL	<b>17</b>	

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	Acc mpanying it ms	paper document(s) attached	el ctronic file(s) attached
VIII-8	Fee calculation sheet	✓	-
VIII-9	Separate signed power of attorney	✓	-
VIII-16	PCT-EASY diskette	-	diskette
VIII-17	Other (specified):	Copy of official action	-
VIII-18	Figure of the drawings which should accompany the abstract		
VIII-19	Language of filing of the International application	Finnish	
IX-1	Signature of applicant or agent		
IX-1-1	Name	SEPPO LAINE OY	
IX-1-2	Name of signatory	Simo Hovi	
IX-1-3	Capacity	Patent Agent	

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10-1	Date of actual receipt of the purported International application	
10-2	Drawings:	
10-2-1	Received	
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported International application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/SE
10-6	Transmittal of search copy delayed until search fee is paid	

**FOR INTERNATIONAL BUREAU USE ONLY**

11-1	Date of receipt of the record copy by the International Bureau	
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